



The Effect of Using Charcoal Toothpaste on Teeth Color Changes in Adolescents

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ABSTRACT

Discoloration is a condition in which the color of the teeth changes due to various causative factors such as physiological and pathological factors or extrinsics and intrinsic factors. Dental dislothesiration treatment one of them can use charcoal toothpaste. Purpose: Knowing the effect of the use of charcoal toothpaste on tooth color changes in adolescents in Pesantren Daarussalam Kawalu Tasikmalaya. Research Methods: This study uses one type of research (Pre-Eksperimental) and one design (One group pre-test and post-test design) The study subjects were as many as 20 people at Pesantren Daarussalam Kawalu Tasikmalaya. The way of research is that researchers take pre-test and post-test data for 21 days of direct examination of respondents' teeth using Shade Guide Vitapan Classical teeth. Data analysis was conducted with the Wilcoxon Signed Ranks statistical test. Results: The results of statistical tests on the effect of using activated charcoal toothpaste (charcoal) on changes in value of 0.000. The hypothesis requirement is accepted, namely <0.05, this shows that there is an influence on the use of charcoal toothpaste on tooth color changes in adolescents in Pesantren.

INTRODUCTION

According to WHO, health is a condition not only the absence of disease, but also a state of complete mental, physical and social well-being. A person's health condition can be described by the health condition of his teeth and mouth, so that the condition of dental and oral health reflects general health (Pudentiana et al., 2021). Dental and oral health is currently still not getting the attention of the community so that dental and oral health is not a priority for some people (Mafuvadze et al., 2013). Based on Basic Health Research in 2018, the dental health of the Indonesian population tends to be poor (Kemenkes RI, 2018).

In the era of globalization, facial aesthetics is one of the things that people pay attention to. Dental aesthetics aims to create beauty and charm to increase the patient's self-esteem and satisfy the important parts of the patient's body (da Silva et al., 2012). Tooth color can affect esthetics and accounts for half of patient dissatisfaction with the aesthetic appearance of teeth (Lajnert et al., 2012). The color of the teeth of people living in different countries and regions depends on race, environmental factors, personal preferences, cultural background, and social class and can affect their perception of tooth color (Montero et al., 2014). In the field of aesthetic dentistry, tooth color is one of the factors that increases people's desire and need for dental services (Ibiyemi & Taiwo, 2011). If the teeth are not kept clean, they will experience tooth discoloration or what is called tooth discoloration.

Tooth discoloration (tooth discoloration) is influenced by several factors: a. intrinsic factors such as changes in the pulp, trauma that occurs during tooth growth, pulpal necrosis, and root canal filling materials b. extrinsic factors caused by colored drinks, tobacco and cigarettes, coffee and tea, and carbonated drinks (Alazmah, 2021). Discolored teeth that are difficult to remove by scaling but can be corrected by bleaching or teeth whitening (Riani et al., 2015).

Currently people use charcoal toothpaste to clean and whiten teeth. The teeth whitening effect of charcoal is based on its great ability to absorb and retain chromophores in the oral cavity. The surface of charcoal is very porous and has a large area which results in effective and fast cleaning of teeth (Vaz et al., 2019). Research conducted proves that brushing teeth using activated charcoal toothpaste for a specified period of time is proven to have an effect on whitening teeth (Agrawal et al., 2018).

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Dental and oral hygiene maintenance is often neglected by teenagers. Meanwhile, in the puberty phase, adolescents are prone to dental and oral health problems. There are many bad habits of teenagers that can damage the cleanliness and health of their teeth and mouth, such as being lazy to brush their teeth at night, eating and drinking habits that are sweet and sticky. According to Riskesdas 2018 data, 51.9% of adolescents aged 13 to 22 years suffer from dental and oral diseases. As is known, the behavior of maintaining oral health in adolescents is still low. This is similar to dental and oral hygiene at Islamic boarding schools (Kementerian Kesehatan RI, 2018).

Hygiene and dental and oral health of adolescents in Islamic boarding schools also need attention because students live with other people. Allows various diseases to be transmitted from one person to another. These habits are usually influenced by the habitual factors of the students before the students come to the Islamic Boarding School (Handayani & Arifah, 2016).

Based on the results of pre-research at the Daarussalaam Kawalu Tasikmalaya Islamic Boarding School on February 3, 2022, measurements of the level of tooth color using the vitapan classical shade guide obtained the results of male and female respondents. As many as 30% of people with red-yellow teeth, 40% of people with red-yellow teeth, 20% of people with gray teeth, and 10% of people with red to gray teeth.

METHOD

This study used one type of research (Pre Experiment) and one design (Onegroup pre-test and post-test design) which were conducted from 26 February 2022 to 13 March 2022 at the Pesantren Daarussalaam Kawalu, Tasikmalaya. The sample of this research was 20 pesantren youths selected by purposive sampling technique. The inclusion criteria were adolescents aged 13-19 years, willing to be respondents, youth free from calculus. Exclusion criteria were teenagers who smoked.

The research was conducted with a pretest and posttest design to see the comparison of tooth color levels using charcoal toothpaste. the researcher divided the 2 study sample groups consisting of 10 male adolescents and 10 female adolescents. The researcher recorded the pretest data by examining the teeth directly using the Vitapan classical shade guide. Adolescents were asked to fill out tooth brushing observation sheets for 21 days in the morning and at night. After 21 days, the researchers collected posttest data by examining the level of tooth color using the Vitapan classical shade guide to compare pretest and posttest data.

The data obtained was then analyzed using a non-parametric test in the form of the Wilcoxon Signed Rank Test, to determine the effect of using charcoal toothpaste on tooth discoloration in adolescents at the Pesantren Daarussalam Kawalu Tasikmalaya with a significance value of less than 0.005.

RESULT

Table 1. Frequency Distribution of Respondents by Gender

Gender	Frequency	Percent (%)
Male	10	50
Female	10	50
Total	20	100

Table 1 shows that in the Daarussalaam Tasikmalaya Islamic Boarding School, there are 10 Males (50%) and 10 Females people (50%).

Table 2. Frequency Distribution of Respondents by Age

Age	Frequency	Percent (%)
13 Years	4	20
14 Years	10	50
15 Years	6	30
Total	20	100

Table 2 shows that there are three age groups 13 years old with 4 people (20%), 14 years old 10 people (50%), 15 years old 6 people (30%)

Table 3. Frequency Distribution of Tooth Color Measurement Before Using Charcoal Toothpaste in Adolescents

Tooth Color	Before	Percent (%)
A2	1	5
A3	4	20
A3.5	4	20
B3	3	15
B4	2	10
C3	2	10
D3	4	20
Total	20	100

Table 3 shows that the color levels of the teeth before using charcoal toothpaste were highest in colors A3, A3.5, D3 with 4 teeth (20%)

Table 4. Frequency Distribution of Teeth Color Measurement After Using Charcoal Toothpaste in Adolescents

Tooth Color	After	Percent (%)
A1	5	25
A2	4	20
B1	5	25
B2	4	20
C1	1	5
C2	1	5
Total	20	100

Table 4 shows that the color levels of the teeth after using Charcoal Toothpaste were highest in the color of teeth A1 and B1, there were 5 teeth (25%).

Table 5. Frequency Distribution of Tooth Color Measurement Before and After Using Charcoal Toothpaste in Adolescents

Tooth Color	Before	Percent (%)	After	Percent (%)
A1	-	-	5	25
A2	1	5	4	20
A3	4	20	-	-
A3.5	4	20	-	-
B1	-	-	5	25
B2	-	-	4	20
B3	3	15	-	-
B4	2	10	-	-
C1	-	-	1	5
C2	-	-	1	5
C3	2	10	-	-
D3	4	20	-	-
Total	20	100	20	100

Table 5 shows that the highest frequency before brushing teeth is in colors A3, A3.5, D3 there are 4 teeth (20%) and the frequency after brushing is highest in tooth colors A1 and B1 there are 5 teeth (25%)

Table 6. Results of the Wilcoxon Signed Rank Test Statistical Test The Effect of Using Charcoal Toothpaste on Tooth Discoloration in Adolescents

Z	-3.999 ^b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

Table 6 shows the results of statistical tests using the Wilcoxon test for tooth discoloration before and after using charcoal toothpaste obtained p-value: $0.000 < 0.05$, which means H_0 is rejected and there are significant results, so there is an effect of using charcoal toothpaste on tooth discoloration in adolescents at the Pesantren Daarussalam Kawalu Tasikmalaya in 2022.

DISCUSSION

Charcoal toothpaste is carbon made from coconut shells, bamboo and wood powder which has undergone an activation process to increase its absorption power. The teeth whitening effect of charcoal is based on its great ability to absorb and retain chromophores in the oral cavity. The surface of charcoal is very porous and has a large area which results in effective and fast cleaning of teeth (Vaz et al., 2019).

This research was conducted for 21 days from 26 February 2022 to 13 March 2022 at the Pesantren Daarussalam Kawalu Tasikmalaya. This research was conducted to see the effect of using charcoal toothpaste on tooth discoloration in adolescents at the Pesantren Daarussalam Kawalu Tasikmalaya. In this study, a sample of 20 adolescents was divided into 2 groups, namely 10 male adolescents and 10 female adolescents.

Based on table 1, there were 10 respondents based on male sex (50%) and women as many as 10 people (50%). Based on table 2, it was found that the most respondents at the age of 14 were 10 people (50%). The age of 12-15 years is the age when hormonal changes occur and in this phase, adolescents pay more attention to the state of their bodies (Das et al., 2017). According to (Athira et al., 2015), there has been an increase in efforts to create a more attractive appearance. Because of the increasing concern for health, teenagers are paying more and more attention to dental health for their appearance. This is a factor in the increase in the level of posttest tooth color in respondents.

Based on table 3, the frequency of brushing teeth before using charcoal toothpaste was obtained in adolescents at the Pesantren Daarussalam Kawalu Tasikmalaya with 20 respondents. The highest frequency in colors A3, A3.4 D3 is 4 teeth (20%). According to (Feliz-Matos et al., 2014) which stated that stain formation usually occurs due to consuming coffee, tea, chromogenic foods, and smoking. This is what causes the color of the teeth before using charcoal toothpaste tends to be yellow or brown.

Based on table 4, the frequency of tooth color after using charcoal toothpaste was obtained in adolescents at the Pesantren Daarussalam Kawalu Tasikmalaya. The highest frequency of tooth color in colors A1 and B1 was 5 teeth (25%). The active charcoal content can whiten teeth. The teeth whitening effect of charcoal is based on its great ability to absorb and retain chromophores in the oral cavity (Franco et al., 2020). The surface of charcoal is very porous and has a large area which results in fast and effective teeth cleaning. This causes the level of tooth color after using charcoal toothpaste to tend to be whiter (Viana et al., 2021).

Treatment for tooth discoloration, one of which uses dental bleaching, but tends to be more complicated because it requires professional supervision and tends to be time-consuming cost (Mondelli et al., 2012). Therefore, people choose to use whitening toothpaste to restore extrinsic tooth stains (Sumendap et al., 2018). Bamboo charcoal (Charcoal) when applied to the oral cavity, this material will clean bacteria, toxins and infections that cause bleeding gums and plaque buildup. Activated charcoal does not discolor teeth but absorbs black plaque on teeth, nicotine, tannins, poisons, bacteria and activated charcoal does not stick to the oral cavity or saliva (Thakur et al., 2020). This is in accordance with research tooth discoloration using charcoal toothpaste. The difference is, people have two groups, namely the group using ordinary toothpaste and charcoal toothpaste. significant results were obtained between the two, but giving charcoal toothpaste in discolored teeth was more effective than giving ordinary toothpaste in discoloring teeth. These results are in line with research proving that brushing your teeth using activated charcoal for a specified period of time is proven to whiten teeth (Vaz et al., 2019).

The results of measurements before and after brushing teeth using charcoal toothpaste using a p-value statistical test of $0.000 (< 0.05)$ obtained significant results from both. This means that there are changes before and after using charcoal toothpaste on changes in tooth color in adolescents at the Daarussalaam Kawalu Islamic Boarding School, Tasikmalaya.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that there is the effect of using charcoal toothpaste on tooth discoloration in adolescents at the Pesantren Daarussalam Kawalu, Tasikmalaya.

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REFERENCES

- Agrawal, P., Panda, S., & Mishra, S. R. (2018). A Review on Activated Charcoal Tooth Paste. *World Journal Of*. <https://doi.org/10.20959/wjpr20189-12132>
- Alazmah, A. (2021). Primary Teeth Stains and Discoloration: A Review. *Journal of Child Science*, 11(01), e20–e27. <https://doi.org/10.1055/s-0040-1722276>
- Athira, S., Jayakumar, H. L., Chandra, M., Gupta, T., Dithi, C., & Anand, P. J. S. (2015). Oral health-related quality of life of school children aged 12-17 years according to the child-oral impacts on daily performances index and the impact of oral health status on index scores. *International Journal of Preventive and Public Health Sciences*, 1(2), 25–30. <https://doi.org/10.17354/ijpphs/2015/13>
- da Silva, G. de C., de Castilhos, E. D., Masotti, A. S., & Rodrigues-Junior, S. A. (2012). Dental esthetic self-perception of Brazilian dental students. *RSBO Revista Sul-Brasileira de Odontologia*, 9(4), 375–381.
- Das, J. K., Salam, R. A., Thornburg, K. L., Prentice, A. M., Campisi, S., Lassi, Z. S., Koletzko, B., & Bhutta, Z. A. (2017). Nutrition in adolescents: physiology, metabolism, and nutritional needs. *Annals of the New York Academy of Sciences*, 1393(1), 21–33. <https://doi.org/10.1111/nyas.13330>
- Feliz-Matos, L., Hernández, L. M., & Abreu, N. (2014). Dental bleaching techniques; hydrogen-carbamide peroxides and light sources for activation, an update. Mini review article. *The Open Dentistry Journal*, 8, 264. <https://doi.org/10.2174/1874210601408010264>
- Franco, M. C., Uehara, J. L. S., Meroni, B. M., Zuttion, G. S., & Cenci, M. S. (2020). The effect of a charcoal-based powder for enamel dental bleaching. *Operative Dentistry*, 45(6), 618–623. <https://doi.org/10.2341/19-122-L>
- Handayani, H., & Arifah, A. N. (2016). Hubungan pengetahuan, sikap dan tindakan kesehatan gigi dan mulut terhadap status kesehatan gigi siswa SMP/MTs Pondok Pesantren Putri Ummul Mukminin. *Makassar Dental Journal*, 5(2). <https://doi.org/10.35856/mdj.v5i2.97>
- Ibiyemi, O., & Taiwo, J. O. (2011). Psychosocial aspect of anterior tooth discoloration among adolescents in igbo-ora, southwestern Nigeria. *Annals of Ibadan Postgraduate Medicine*, 9(2), 94–99.
- Kementerian Kesehatan RI. (2018). Laporan Nasional Riset Kesehatan Dasar 2018. *Riskesdas*, 614.
- Lajnert, V., Pavicic, D. K., Grzic, R., Kovac, Z., Pahor, D., Kuis, D., Simoncic-Kocijan, S., Antonic, R., & Bakarcic, D. (2012). Influences of age and maxillary anterior teeth status on patient's satisfaction with dental appearance and tooth colour. *Gerodontology*, 29(2), e674–e679. <https://doi.org/10.1111/j.1741-2358.2011.00543.x>
- Mafuvadze, B. T., Mahachi, L., & Mafuvadze, B. (2013). Dental caries and oral health practice among 12 year old school children from low socio-economic status background in Zimbabwe. *The Pan African Medical Journal*, 14. <https://doi.org/10.11604/2Fpamj.2013.14.164.2399>
- Mondelli, R. F. L., Azevedo, J. F. D., Francisconi, A. C., Almeida, C. M. de, & Ishikiriyama, S. K. (2012). Comparative clinical study of the effectiveness of different dental bleaching methods-two year follow-up. *Journal of Applied Oral Science*, 20, 435–443. <https://doi.org/10.1590/S1678-77572012000400008>
- Montero, J., Gómez-Polo, C., Santos, J. A., Portillo, M., Lorenzo, M. C., & Albaladejo, A. (2014). Contributions of dental colour to the physical attractiveness stereotype. *Journal of Oral Rehabilitation*, 41(10), 768–782. <https://doi.org/10.1111/joor.12194>
- Pudentiana, R. R., Purnama, T., Tauchid, S. N., & Prihatiningsih, N. (2021). Knowledge of Oral and Dental Health Impacts the Oral Hygiene Index Simplified (OHI-S) of Primary School Children. *Indian Journal of Forensic Medicine & Toxicology*, 15(4), 2179–2183.
- RI, K. (2018). Hasil utama riskesdas 2018. *Jakarta: Kemenkes RI*.
- Riani, M. D., Oenzil, F., & Kasuma, N. (2015). Pengaruh aplikasi bahan pemutih gigi karbamid peroksida 10% dan hidrogen peroksida 6% secara home bleaching terhadap kekerasan permukaan email gigi. *Jurnal Kesehatan Andalas*, 4(2). <https://doi.org/10.25077/jka.v4i2.252>
- Sumendap, I. B., Herda, E., & Eriwati, Y. K. (2018). Effect of whitening toothpaste on the discoloration level of stained conventional glass ionomer cement. *Journal of Physics: Conference Series*, 1073(6), 62013. <https://doi.org/10.1088/1742-6596/1073/6/062013>
- Thakur, A., Ganeshpurkar, A., & Jaiswal, A. (2020). Charcoal in dentistry. *Natural Oral Care in Dental Therapy*, 197–209. <https://doi.org/10.1002/9781119618973.ch13>
- Vaz, V. T. P., Jubilato, D. P., Oliveira, M. R. M. de, Bortolatto, J. F., Floros, M. C., Dantas, A. A. R., & Oliveira, O. B. de. (2019). Whitening toothpaste containing activated charcoal, blue covarine, hydrogen peroxide or

microbeads: which one is the most effective? *Journal of Applied Oral Science*, 27. <https://doi.org/10.1590/1678-7757-2018-0051>

Viana, Í. E. L., Weiss, G. S., Sakae, L. O., Niemeyer, S. H., Borges, A. B., & Scaramucci, T. (2021). Activated charcoal toothpastes do not increase erosive tooth wear. *Journal of Dentistry*, 109, 103677. <https://doi.org/10.1016/j.jdent.2021.103677>